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I, Alfred H. Muratori,  certify that this paper was deposited with the United States Postal Service addressed to the Assistant Commissioner for Patents, Mail Stop Non-Fee Amendment, P.O. Box 1450 Alexandria, VA 22313-1450, first class, postage prepaid on Thursday, April 22, 2004.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)
SCHMITT et al.)
Serial No. 10/019,082) Art Unit: 1775
Filed: 27 January, 2003) Examiner: Stephen J. Stein
For: ELECTRONIC AND OPTICAL)
MATERIALS)

RESPONSE

Assistant Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In respect of the Office Action mailed 22 January, 2004, kindly consider the following remarks.

Amendment

It should first be noted that the office action appears to be based on the claims as originally filed in the PCT application. The claims in the PCT, however, were replaced with substitute sheets in response to the written opinion and a copy of this submission is attached. A copy of the IPER, showing the examination on the basis of the new claims 1-16, is also attached. Thus it is asserted that claims 1-16 as shown on the following page, are the claims as they stand in the PCT and as should have been examined in the US application. Following the claims is a page having an abstract for insertion after the claims.

Claims 1-16 (as originally filed) are pending.

In order to provide a response that fully answers the office action, the arguments with respect to the prior art that were submitted in the PCT are herein repeated:

Claim 1 in the substitute sheet is directed to epitaxial Barium Strontium Titanate (BST) on c-plane sapphire, BST ranging from barium titanate to strontium titanate and the mixed oxides. Although the Examiner has cited references showing epitaxial strontium titanate on r-plane sapphire, he has not cited references showing epitaxial barium titanate, epitaxial strontium titanate, or (the mixed oxide) epitaxial barium strontium titanate on c-plane sapphire. Accordingly, Claim 1 has novelty over all of the cited references.

Claim 8 in the substitute sheet is directed to epitaxial BST where the atom ratio of Ba to Sr ranges from 10:90 to 90:10. Although the Examiner has cited references showing epitaxial strontium titanate on sapphire, no references has been cited showing the epitaxial mixed oxide, barium/strontium titanate. Accordingly, Claim 8 has novelty over all of the cited references.

Neither of the Azuma et al. references, 5,612,082 or 5,624,707 describes deposition of epitaxial layers.

In Kashihara et al., 5,572,052, PZT and PZLT layers are grown, sapphire being a suggested substrate; however, deposition of epitaxial barium titanate, strontium titanate or BST on sapphire are not shown or suggested.

In Neuman et al., 5,132,282, epitaxial strontium titanate (not mixed Ba/Sr titanate) is grown on r-plane (or "plane {1102}") sapphire. (Col. 6, line 3) The same is true of Neuman et al. PCT/US92/01788. (P. 9, line 22)

There is no teaching or suggestion in the Tsuzumi abstract, JP 11031921, that the deposited layers are epitaxial.

Like the Neuman et al. references, the Desu et al. reference, EP 0630424, describes deposition on r-plane sapphire. The 3.5 Angstrom lattice spacing is the distance between planes in r-plane sapphire (P. 10, line 20)

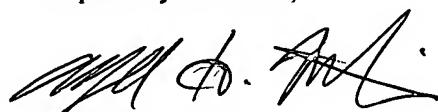
Not only do Claims 1 and 8 exhibit novelty over the cited prior art, but they represent an inventive step.

Regarding Claim 1, previously, strontium titanate had been grown on the r-plane of sapphire. The titanates to which the present invention is directed have a cubic structure, thus the tetragonal configuration of the r-plane is an apparent match for depositing epitaxial titanates of cubic structure. On the other hand, the c-plane is hexagonal and not an apparent lattice match for cubic titanates. In fact, in accordance with the invention, c-plane sapphire is found to be advantage for epitaxial growth, producing higher yield and improved performance. The c-plane of sapphire also has advantages in respect to patentability.

Regarding Claim 8, the mixed oxide, barium strontium titanate, is a more complex oxide to deposit than strontium titanate, introducing an additional cation. Furthermore, the lattice structure of BST is changed in dimension relative to strontium titanate; accordingly, just because strontium titanate can be deposited epitaxially on sapphire, it would not be known that BST could be epitaxially deposited. BST has different electrical characteristics than strontium titanate and is therefore desired for certain electrical applications, particularly as a dielectric material.

For the reasons set forth above, a favorable opinion is respectfully requested.

Respectfully Submitted,



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